To optimize the process conditions is needed to analyze the electrical impedance of the casted samples. The most important factors that causes changes in the conductivity of our samples are the concentration of the compatible polymer and the protonation of the mixture. After using our response variable to determine the best conditions to obtain the research material is planned to review and determine whether the addition of extra additives improves the properties of the material so that the casted material would has shape memory property due to a structure similar to a macro porous sponge [9] which is achieved with the evaporation of the chloroform that forms part of the micelles formed in the emulsion.

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BIOMIMETIC SOL-GEL MINERALIZATION OF POLYSACCHARIDES BY SILICON AND TITANIUM POLYOLATES*

Keywords: silicon and titanium polyolates, polysaccharides, biomimetic sol-gel mineralization, element-containing hydrogels, dental films.

Currently, biomineralization is defined as the fundamental biological process by which living organisms produce minerals with multifunctional properties [1]. Any biomineralization process occurs in the context of an organic matrix, which plays a conditioning role in mineralization. The structures of obtained biocomposite materials are highly controlled from the nanometer to macroscopic level, resulting in complex architectures.

Biomimetic mineralization is a process modeling biomineralization and resulting in the formation of hybrid materials with an unique structure and a set of new useful properties. Polysaccharides are widely used in this process as structure-forming agents (templates). Sol-gel processing is usually used when carrying out biomimetic mineralization of polysaccharides, and silicon alkoxides $Si(OR)_4$ (R = Me, Et) are typically used for this purpose as precursors [2].

Earlier we applied silicon tetraglycerolate $Si[OCH_2CH(OH)CH_2OH]_4$ as biocompatible water-soluble precursor for the preparation by the biomimetic sol-gel mineralization under mild conditions of silicon-chitosan-containing transparent monolithic hydrogel with wound healing, regenerating, hemostatic and antimicrobial activity [3, 4]. In this case, chitosan accelerates gelation, and exerts a substantial effect on the biomimetic sol-gel mineralization resulting in the formation of polymeric silicon-containing 3D-network.

In this work, we have demonstrated that in addition to silicon tetraglycerolate, a new water-soluble biocompatible polyolate precursors – silicon tetrapolyethylene glycolate $Si[O(CH_2CH_2O)_nH]_4$ [5, 6] and titanium tetrapolyethylene glycolate $Ti[O(CH_2CH_2O)_nH]_4$ [5] – can be successfully utilized in biomimetical mineralization of polysaccharides of various nature. By the example of chitosan (cationic), xanthan gum (anionic), and hydroxyethyl cellulose (uncharged) polysaccharides, an accelerating effect has been demonstrated on the gelation process and a stabilizing effect has been revealed on the hydrogels formed as transparent monoliths showing resistance to syneresis. Thus formed silicon- and titanium-containing 3D-network of gels is found to be polymeric and appears to have ordered amorphous morphostructure, which can be explained as caused by the influence from the polysaccharides serving as templates. The presence of polyolate bridges between silicon or titanium atoms in the polymeric network is characteristic of polyolate precursors only and is determined mainly by the nature of the precursor and by the contents of polyol and water in the system. The formation of polyolate bridges is facilitated by the low reactivity of the precursor, by low water content, and also by polyol excess in the system. The sol-gel process utilized to obtain the silicon- and titanium-polysaccharide-containing hydrogels proceeds under the mild conditions at room temperature, with no catalyst or any organic solved to be used, and thus can be regarded as belonging to the green chemistry methods that show promise for biomedical materials applications.

In addition, we have developed silicon-chitosan-containing dental films, intended for the treatment of periodontitis. Dental films are today an innovative dosage form that is extremely popular and effective.

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AZAHETEROCYCLIC PUSH-PULL CHROMOPHORES: SYNTHESIS, PHOTOPHYSICAL PROPERTIES AND APPLICATIONS AS FLUORESCENT SENSORS*

Keywords: pyrimidine, pyrazine, fluorescence quenching, push-pull fluorophores.